

ARI Research Note 94-01

AD-A273 112



# Compatibility Evaluation and Research on the Computerized Adaptive Screening Test (CAST) Final Report: User and Programmer's Guide

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American Institutes for Research

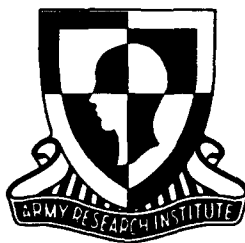
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October 1993



93-28853



**United States Army  
Research Institute for the Behavioral and Social Sciences**

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03 1 04 037

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REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
<small>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.</small>				
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE 1993, October	3. REPORT TYPE AND DATES COVERED Final Oct 89 - Jan 91		
4. TITLE AND SUBTITLE Compatibility Evaluation and Research on the Computerized Adaptive Screening Test (CAST) Final Report: User and Programmer's Guide		5. FUNDING NUMBERS DAAL03-86-D-0001 63007A 792 233 *C01 DO# 1726 (89-531)		
6. AUTHOR(S) Park, Randolph K.; and Dunn, Michael L.		8. PERFORMING ORGANIZATION REPORT NUMBER --		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) American Institutes for Research 3333 K Street, NW, Suite 300 Washington, DC 20007		10. SPONSORING / MONITORING AGENCY REPORT NUMBER ARI Research Note 94-01		
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences ATTN: PERI-RS 5001 Eisenhower Avenue Alexandria, VA 22333-5600		11. SUPPLEMENTARY NOTES Contracting Officer's Representative, Frances C. Grafton.		
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.		12b. DISTRIBUTION CODE --		
13. ABSTRACT (Maximum 200 words) The Computerized Adaptive Screening Test (CAST) is used for predicting performance on the Armed Forces Qualification Test (AFQT). The goal of this project is to ensure CAST compatibility with the Electronic Information Delivery System (EIDS) now being fielded by the U.S. Army Recruiting Command. A number of software enhancements were implemented. Improvements were made in test item selection, reporting capability, experimental item selection, data storage capability, and software coordination. This report is a guide for users and programmers.				
14. SUBJECT TERMS Computerized adaptive testing Arithmetic reasoning			15. NUMBER OF PAGES 32	
Word knowledge ASVAB			16. PRICE CODE --	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT Unlimited	

## FOREWORD

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The Army faces a continuing demand to meet recruiting quality goals. Recent advances in computer technology and psychometric theory have made possible a new type of assessment technique, called computerized adaptive testing (CAT), that can provide accurate ability estimates based on relatively few text items. The Computerized Adaptive Screening Test (CAST) was designed to provide an estimate of a prospect's Armed Forces Qualification Test (AFQT) score at the recruiting station. Recruiters use CAST to help determine whether to send prospects to Military Entrance Processing Stations for further testing and to forecast the various options and benefits for which the prospects will subsequently qualify. This report is a guide for CAST users and programmers.

This research was conducted under the Manpower and Personnel Research Program and contributes to the mission of the Selection and Classification Technical Area to improve the Army's capability to select and classify its applicants using state-of-the-art, fair measures to assess applicant potential. Continuing research and development of CAST is conducted under the sponsorship of the U.S. Army Recruiting Command (USAREC) as outlined in a Memorandum of Understanding dated 29 August 1984 regarding the U.S. Army Research Institute/USAREC Research and Development Program. The results of this report are being used to further document the evaluation of CAST as a screening tool and to direct future refinement efforts.

COMPATIBILITY EVALUATION AND RESEARCH ON THE COMPUTER ADAPTIVE SCREENING TEST  
(CAST) FINAL REPORT: USER AND PROGRAMMER'S GUIDE

EXECUTIVE SUMMARY

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Requirement:

To provide program maintenance and ensure software compatibility of the Computerized Adaptive Screening Test (CAST) with the Electronic Information Delivery System (EIDS), and further refine the CAST item selection software and score reporting format.

Procedure:

The CAST program software was rewritten to be compatible with the Electronic Information Delivery System (EIDS) now being used by the U.S. Army Recruiting Command (USAREC). In addition, further development was done to refine the item selection software and score reporting format. Improvements were made in test item selection, reporting capability, experimental item selection, data storage capability, item bank access, and software coordination.

Findings:

The revised CAST is less prone to compromise, allows the researcher more flexibility in gathering CAST data, requires less access time, and is configured for greater compatibility with the EIDS.

Utilization of Findings:

This report will be used by the U.S. Army Recruiting Command as part of its ongoing evaluation of CAST as an enlistment screening test.

COMPATIBILITY EVALUATION AND RESEARCH ON THE COMPUTER ADAPTIVE SCREENING TEST  
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**COMPATIBILITY EVALUATION AND RESEARCH ON THE COMPUTER ADAPTIVE SCREENING TEST  
(CAST) FINAL REPORT: USER AND PROGRAMMER'S GUIDE**

**GENERAL OVERVIEW**

The Computer Adaptive Screening Test (CAST) has been an extremely useful job aid for Army recruiters. It allows them to determine quickly whether a prospect is likely to qualify for enlistment and enlistment bonuses. With this knowledge, recruiters can avoid wasting considerable amounts of their own time and raising the prospect's expectations unnecessarily. Instead, the recruiter can concentrate his or her efforts on those prospects whom the Army needs most. This type of job aid is now more important than ever as recruiters are being stretched to the limit to meet recruiting goals in an increasingly difficult recruiting environment.

The CAST ran successfully on the Joint Optical Integration Network (JOIN) system that was installed in recruiting stations throughout the country. The Army Research Institute, supported by a team lead by the American Institutes for Research completed a major revision to the CAST. This effort included

- significant expansion and recalibration of the item bank,
- editorial and statistical screening of all items for sensitivity and fairness and for appropriate statistical properties,
- revision of the item selection software to increase precision at key points and to decrease the predictability of the sequence of items selected, and
- revision of the form and substance of the information provided to the recruiter and the prospect to increase interpretability and usability.

The CAST revision project was highly successful in meeting each of its objectives. The project did not, however, include any technical assistance to the programming staff of the U.S. Army Recruiting Command (USAREC). More important, the JOIN systems are being replaced with a new system, the Electronic Information Delivery System (EIDS), and the CAST software must be able to run on this new system.

This report summarizes the effort by the Army Research Institute, supported by a team from the American Institutes for Research to

- provide program maintenance and ensure CAST compatibility with the EIDS, and
- further refine the item selection software and score reporting format.



Given the above objectives, this report is framed as a guide to the user and to the programmer. Information for the user begins on page 3 and continues through the section on "Administering Tests with CAST." The section on "Changing Technical Parameters in the CAST" is intended for researchers and program managers. The programmer's guide begins on page 13 and continues through the end of the text. A copy of the software is enclosed.

As part of this project, under separate cover, we also report on an evaluation on automating the collection of CAST scores from the field, and lay out the functional specifications of an automated CAST data collection system. This technical report is entitled "Functional Requirements of an Automated Data Collection System for the Computerized Adaptive Screening Test" by R. Park and R. Rosse.

## INTRODUCTION

### What CAST Is

CAST is the acronym for the Computerized Adaptive Screening Test component of the U.S. Army Recruiting Command's EIDS computer system. CAST consists of computer programs that administer screening tests to enlistment prospects, score those tests, and estimate the prospect's test score and mental category on the Armed Forces Qualification Test (AFQT) of the ASVAB.

CAST consists of two tests -- Word Knowledge and Arithmetic Reasoning. Both tests are adaptively administered; that is, test items are chosen one at a time, so that the difficulty of the next test item closely matches the examinee's performance up to that point.

CAST has been available for use in Army Recruiting Stations since 1986. A modified version, CAST Version 2 was used briefly, in late 1987 and 1988, for research. An enhanced CAST Version 3 has been used since 1989 on the JOIN computer system. This document describes a revised version of CAST, CAST Version 4, which is designed to run on IBM PC Clones.

### What's New About Version 4 of CAST

CAST Version 4 contains a number of modifications and enhancements of the CAST Version 3. The following is a list of noteworthy changes contained in Version 4.

New technical features of CAST Version 4 include the following:

- a) Improved accuracy for predicting mental categories. Rounding error was reduced so that probability values for membership in mental categories sum to 100%.
- b) Improved test item selection. The first administered item is selected from a pool of candidate 'first items'. This makes CAST Version 4 less prone to compromise.
- c) Improved reporting capability. Gives user the choice of using the old report format from Version 3 or the USAREC report format.
- d) Improved interactive PARM setup. CAST Version 4 has a detailed utility to determine number of items and where they are to be placed. It is capable of entering a debugging mode to display updated ability estimates and standard deviations, item bank information, and write out item-level research data to another disk.
- e) Reduction in Access Time. The full item bank, parameters, and information tables are read in as part of the program. There is

no longer any need to access the disk after each question.

- f) Improved experimental item selection. CAST Version 3 picked experimental items from assigned clusters. CAST Version 4 will randomly pick items from the experimental item bank.
- g) Improved data storage capability. Gives user the choice of defining where the data will be stored.
- h) Improved item bank access. A protected utility allows the user to enter, edit, and remove test items. The utility program allows the translation of text into binary data.
- i) Improved software coordination. Filename defaults were changed in accordance with USAREC naming conventions.

## USER'S GUIDE

CAST Version 4 includes programs for two different functions. One set of programs administers the CAST tests and prints a report, intended for use by the recruiter, that predicts the prospect's AFQT performance. Another program enables the researcher to manipulate the test administration process; this program is intended for the use of CAST system managers and researchers.

This User's Guide is organized along those same functional lines. Separate sections deal with using CAST for test administration, and with using it to produce detailed technical reports.

This guide is intended as a supplement to the User Manual for the Computerized Adaptive Screening Test, already in use in the U.S. Army Recruiting Command.

## ADMINISTERING TESTS WITH CAST

### Overview

This section of the User's Guide is intended for recruiters and others who will administer the CAST test on the EIDS system.

### Getting Started

Administering the CAST requires certain computer equipment and software.

Hardware Required. CAST operates on the EIDS System. The CAST requires the use of the EIDS computer, the display monitor, and the printer.

Software Required. CAST Version 4 consists of two software disks: a program disk and a data disk. The program disk must be placed in disk drive A: of the EIDS computer; the data disk must be in disk drive B:. CAST Version 4 will not administer tests without both of these disks.

### Tutorial

The CAST test is intended to be administered to a prospect by the recruiter, in the recruiting office as part of the EIDS System. This tutorial contains instructions for the recruiter who will administer the CAST test.

The CAST User's task is quite simple. There are three major activities: starting the CAST program, registering the examinee, and displaying the results. The tutorial describes each of these activities briefly. A more complete description is contained in the User Manual for the Computerized Adaptive Screening Test, which was prepared for the original version of CAST by the Navy Personnel Research and Development Center.

The instructions that follow presume that the CAST User is familiar with the operation of the EIDS computer system.

### Starting the CAST computer program

The CAST program may be started automatically by the EIDS system, or manually by the User.

Automatic Start. The CAST computer program starts automatically at the end of the EIDS session, when requested by the User. The computer screen will prompt the User to put the CAST program disk in Drive A of the computer; at this point, the CAST Data Disk should be placed in Drive B.

Manual Start. The User may start the CAST program manually in two ways. The first is done with the computer turned off. Place the CAST Program Disk in Drive A, close the disk drive door, and turn the computer on. After a few

moments, the CAST program will start automatically.

The second method is used when the computer is already turned on. To start CAST in this situation, place the CAST Program Disk in Drive A, close the door, and press the computer's reset button. The CAST program will start automatically after a few moments.

Summary. There are three ways to start the CAST computer program: 1) automatically, at the end of the EIDS session; 2) by placing the CAST Program Disk in Drive A, and turning the computer on; 3) by placing the CAST Program Disk in Drive A and pressing the computer's RESET button.

#### **Administering a CAST test**

Once the CAST computer program has started, it has only one function: to administer the CAST test. To proceed, the User has only to read the instructions that appear on the screen and follow them.

The first screen displayed by CAST contains the CAST logo; at the bottom it prompts the User to

PRESS <ENTER> WHEN READY

Press the key labeled ENTER on the keyboard to proceed.

The program then checks for the identifying information. This includes both the data collection diskette and the prospect information diskette. If this information is not found, the computer will prompt the user to insert the corresponding diskette into the proper disk drive.

Once all the identifying information has been completed, the CAST test will begin. At this point, the examinee should be seated at the computer and ready for testing. When the examinee is ready to begin testing, he or she should press the key labeled ENTER on the keyboard.

The examinee can be left alone while CAST testing is in progress. Self-explanatory instructions are displayed on the computer screen. Examples of the screen text are in the User's Manual.

If at any time during testing the examinee enters the incorrect key, in response to a prompt, three times in a row, the following message will appear:

You seem to be having trouble  
understanding the directions.  
Please call the recruiter  
for assistance. Thank you!

PRESS <ENTER> WHEN READY

Following this screen the computer prompts the recruiter to enter his passcode.

Recruiter,  
Please enter your passcode

At this point, type the passcode: ARMY. If the passcode is entered correctly, the program will proceed with the following screen:

The applicant was repeatedly  
giving inappropriate answer  
alternatives.

PRESS <ENTER> WHEN READY

After the ENTER key is pressed, the recruiter is given the following menu to choose for the appropriate course of action:

Which of the following courses of  
action do you wish to take?

- A) START THE TEST AGAIN  
FROM THE BEGINNING
- B) RESTART THE CURRENT  
SUBTEST
- C) CONTINUE THE TEST
- D) STOP THE TEST

ENTER YOUR SELECTION

The User then enters the letter corresponding to the desired action.

When the CAST is finished, a screen message to the examinee will appear:

The CAST test has ended.  
Please inform the recruiter that  
you have completed the CAST test.

Press ENTER key twice to continue.

#### Displaying the CAST test results

Once an examinee has finished the CAST test, the recruiter can display the results on the screen, and/or print them on the printer. This must be done immediately upon test completion.

The test results are protected to ensure examinee privacy and system security. To display the results, the User must first enter the system password. A screen message will state:

RECRUITER,

PLEASE ENTER YOUR PASSCODE

At this point, type the passcode: ARMY and press the ENTER key. If the passcode is entered correctly, the program will proceed to the score report function. If the passcode is entered incorrectly, the system will sound a warning tone; at this point try again to enter the passcode, ARMY.

Once the passcode is correct, the screen will display:

DO YOU WANT TO DISPLAY THE CAST  
RESULTS? (Y/N)

Press the Y key, then the ENTER key to answer "yes". The next screen will display the test results, in narrative and graphic form.

The results give the probability that the examinee will score in each of three AFQT mental categories when he/she takes the ASVAB. The three categories are 1) mental category 1, 2, or 3a; 2) category 3b; and 3) category 4 or 5.

To proceed past the results screen, press the PAGE FWD key. The next screen offers a printout of the CAST results:

DO YOU WANT A PRINTOUT OF THE CAST  
RESULTS? (Y/N)

Press Y, then ENTER, for a printed copy of the score report. The screen will display instruction for setting up the printer, and instruct you to press ENTER To begin printing. You may cancel the print process by pressing the Esc key at this time.

The printout begins as soon as the ENTER key has been pressed. When the printing is complete, the following screen instructions appear:

Remove the CAST program diskette from  
Drive A and replace it with the Sales  
Presentation Disk.

Remove the CAST data diskette from  
Drive B and replace it with the  
Prospect Data Disk

PRESS THE ENTER KEY WHEN READY

At this point, CAST testing is complete.



**PRINTING DETAILED TECHNICAL DATA FROM CAST TESTS**  
(Versions 3 and 4)

The CAST disks contain a set of four chained programs that allow the User to print detailed, item-by-item records of the CAST test recorded on any CAST Data Disk.

The program gives the User the choice of printing these reports for:

- 1) All examinee records on the Data Disk;
- 2) An individual examinee;
- 3) The last examinee tested.

The use of this program is self-explanatory once the program is running. To run the report program, do the following:

- a. Start the CAST program normally.
- b. When the CAST logo is displayed, press the ESC key. This will cause the CAST program to halt, and give the User control of the operating system. The system prompt will be displayed.
- c. Type RUN REPORT, and press RETURN.

After a moment, the heading "CAST REPORT PROGRAM" will appear on the screen, followed by instructions. Press the RETURN key to continue the program.

The next screen gives directions to ensure the CAST disk is in Drive A and the Data Disk is in Drive B. As prompted, press RETURN when the proper disks are in place.

The following screen gives the User the three options listed above:

**DISPLAY/PRINT RESULTS FOR:**

- 1) ALL EXAMINEES
- 2) ONE EXAMINEE
- 3) LAST EXAMINEE

Enter your choice, and then press RETURN. Follow the instructions that appear on the screen. Be sure to use the shift key to answer Y or N, since this part of the program does not recognize lower case letter input.

When the User has finished the program, the operating system prompt will appear, and the system may be used as desired.

## CHANGING TECHNICAL PARAMETERS IN THE CAST

The PARAMS program is intended for use by systems managers and researchers. It has five major functions as exemplified by the initial menu screen:

1. Set Switches
2. Set Item Information
3. Set File Names
4. Set Scoring Variables
5. Set Experimental Data
6. QUIT

A detailed discussion of each function follows.

### Set Switches

This option controls display of the item pool for inspection purposes by the researcher. It allows the following functions:

1. Display Item Data (default=OFF). When ON, display after the real-time item response: the item parameters, examinee response, and real-time estimates of Bayesian theta and variance.
2. Display All Items (default=OFF). When ON, all items in item pool are displayed one at a time.
3. Enable ESCAPE (default=OFF). The ESCAPE key is activated to facilitate easy termination of program.
4. Write Data to Disk (default=ON). Allows the data to be transferred to a data disk for later mailing to the researcher.
5. QUIT

### Set Item Information

This option controls subtest lengths. Additional items from the item pool may be adaptively administered to examinees of lower ability levels. It allows the following functions:

1. Total Number of WK Items (default=257). This is the size of the WK item pool.
2. Total Number of AR Items (default=254). This is the size of the AR item pool.
3. Number of WK Items to Administer (default=10). This is the length of WK subtest.
4. Number of AR Items to Administer (default=5). This is the length of AR subtest)
5. Number of Extra Items if WK Score is Low (default=5). Additional WK items given to low ability examinees.
6. Theta Value to Determine Low WK (default=.68). The .68 level corresponds to AFQT percentile of IIIA and below.
7. Number of Extra Items if AR Score is Low (default=5). Additional AR items given to low ability examinees.
8. Theta Value to Determine Low AR (default=.68). The .68 level

9. corresponds to AFQT percentile of IIIA and below.  
QUIT

#### Set File Names

This option controls the file names for input and output. The default nomenclature is consistent with USAREC naming conventions.

1. Item Level File Name (default=CAST.DAT).
2. Temporary Work File (default=CASTTEMP.XXX).
3. Input Work File (default=WORK01.DAT).
4. Output Work File (default=WORK02.DAT).
5. Report Program Name (w/o .EXE) (default=REPORT2).
6. QUIT

#### Set Scoring Variables

This option controls the coefficients of predicting AFQT from the CAST subtest scores.

1. First WK Probability Parameter (default=-2.57).
2. Second WK Probability Parameter (default=1.96).
3. Third WK Probability Parameter (default=.27).
4. First AR Probability Parameter (default=-2.00).
5. Second AR Probability Parameter (default=1.49).
6. Third AR Probability Parameter (default=2.36).
7. WK Regression Coefficient (default=14.41).
8. AR Regression Coefficient (default=11.18).
9. Regression Coefficient (default=42.775).
10. QUIT

#### Set Experimental Data

This option controls placement of additional items from the experimental item pool. Experimental items are administered non-adaptively at the specified subtest location.

1. Total Experimental WK Items (default=96). This is the size of the experimental WK item pool.
2. Total Experimental AR Items (default=96). This is the size of the experimental AR item pool.
3. Number of WK Items to Administer (default=0).
4. Number of AR Items to Administer (default=0).
5. Placement of Experimental Items. This specifies the exact positions of the items for administration.
6. QUIT

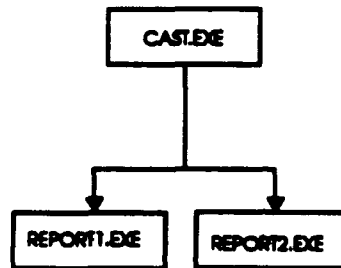
## PROGRAMMER'S GUIDE

Version 4 of the CAST System consists of two subsystems: PARAMS and CAST. The PARAMS subsystem sets up the parameters for the desired execution of the CAST program. The CAST subsystem contains the software that administers the CAST tests, scores them, records the results on a data disk (if specified), and prints the results (if specified).

The CAST subsystem is intended for use by Army recruiters. The PARAM subsystem is for use by researchers or by the system manager, for statistical analysis or software testing purposes.

The PARAMS subsystem is a stand-alone program in which the researcher or systems manager may adjust the parameters used by the CAST subsystem for a specialized execution of the program.

The general program flow of the CAST subsystem is as follows:



After the CAST program has administered the test and computed the desired results, control is directed to either REPORT1 or REPORT2 to complete the execution of the CAST subsystem.

REPORT1 prints a report of the examinee test results.

REPORT2 prints a report of the examinee's predicted AFQT score.

When the CAST subsystem is completed, control is to revert to the Sales Presentation disk.

## SYSTEM SOFTWARE

The CAST and PARAMS subsystems programs were written in the QuickBasic programming language. All assembly language routines in CAST version 3 and supporting tools have been rewritten in QuickBasic.

The following programming tools were employed in the development of the current CAST system :

QuickBasic Ver. 4.0

Used to compile the following QuickBasic source programs: CAST.BAS, PARAMS.BAS, REPORT1.BAS, REPORT2.BAS, BUILDINX.BAS, BUILDBSV.BAS, TXTTOBIN.BAS, BINTOTXT.BAS

## SUPPORT FILES

### Input Files

The CAST programs and subprograms require certain input data on disk files in order to perform their functions. CAST is primarily a system for interactive administration and processing of ability tests. As such, it requires prerecorded data such as the text of numerous test questions, statistical data that describes the test questions, and precomputed tables that identify test questions for response-contingent selection and administration.

These prerecorded data were supplied to programmers in the form of ASCII source data files by the Army Research Institute to the prime contractor, the American Institutes for Research.

For use in CAST version 4, the programmers compressed the source data files. These files were converted into the program format using four proprietary conversion programs: TXTTOBIN.EXE, BUILDBSV.EXE, BINTOTXT.EXE, BUILDINX.EXE, these programs were written in QuickBasic for use on IBM compatible micro computers.

TXTTOBIN.EXE	converts a test item text file to a binary format.
BINTOTXT.EXE	converts a binary file containing test items into a text format that can be edited using an appropriate editor.
BUILDBSV.EXE	properly saves a binary data file in such a way that it can be bloaded and accessed by the CAST programs.
BUILDINX.EXE	generates an index from the test item binary files, the indices serve as pointers to the compressed binary test items.

The following is a description of the binary support files:

ITEM FILES:

ARITEMS.BIN      compressed binary file of arithmetic reasoning test  
                 items (1 - 254).  
  
WKITEMS.BIN      compressed binary file of word knowledge test items (1  
                 - 257).

\*\*\*\* FORMAT \*\*\*\*

ASCII file:      OUR OUTFITS WERE JALIKEK |  
                 LOOSE  
                 STYLISH  
                 SIMILAR  
                 WRINKLED  
                 FLASHY  
                 3  
                 1

MEANING:          Question line with word enclosed by a j and k,  
                 separator  
                 answer #1  
                 answer #2  
                 answer #3  
                 answer #4  
                 answer #5  
                 correct answer #  
                 item number (columns 1 - 3, right justified)

INDEX FILES:

ARITEMS.INX      compressed binary file of arithmetic reasoning test  
                 items index.  
WKITEMS.INX      compressed binary file of word knowledge test items  
                 index.

\*\*\*\* FORMAT \*\*\*\*

ASCII file:      0  
                 64  
                 ...

MEANING:          pointer value to item number 1  
                 pointer value to item number 2  
                 etc.

## PARAMETER FILES:

AR.PRM            compressed file of arithmetic reasoning item  
                 parameters  
WK.PRM            compressed file of word knowledge item parameters

\*\*\*\* FORMAT \*\*\*\*

ASCII file:       Each record of length 13 contains 3 floating point  
                 numbers.

## INFORMATION TABLE FILES:

AR.INF            arithmetic reasoning information table  
WK.INF            word knowledge information table

Binary File:      item numbers

Meaning:          Matrix of 700 binary item numbers arranged as follows:  
                 (35 columns x 20 rows), where each column corresponds  
                 to a discrete ability interval, and each item numbers  
                 are ordered by information value (highest first)  
                 within each row.

## PROGRAM PARAMETER FILE:

PARAMS.LST        ASCII file containing the technical parameters used  
                 for administering CAST in various modes. This file can  
                 be modified using the PARAMS subsystem.

\*\*\*\* FORMAT \*\*\*\*

The annotated defaulted file contents are shown below.

ASCII file:	0,	***	debug flag
	0,	***	all item debug flag
	0,	***	enable escape flag
	257,	***	maximum number of Word Knowledge items
	254,	***	maximum number of Arithmetic Reasoning items
	10,	***	test length of WK
	5,	***	test length of AR
	5,	***	number of extra WK items
	0.68,	***	theta for extra WK items
	5,	***	number of extra AR items
	0.68,	***	theta for extra AR items
	-2.57,	***	probability parameter 1
	1.96,	***	probability parameter 2
	0.27,	***	probability parameter 3



-2.00,	***	probability parameter 4
1.49,	***	probability parameter 5
2.36,	***	probability parameter 6
14.41,	*	regression coefficient for WK
11.18,	***	regression coefficient for AR
42.775,	***	regression constant
-1,	***	write to disk flag
CASTTEMP.XXX,	***	temporary result file name
CAST.DAT,	***	output result file name
REPORT2,	***	print result file name
WORK01.DAT,	***	input work file name
WORK02.DAT,	***	output work file name
96,	***	number of WK experimental items
96,	***	number of AR experimental items
0,	***	flag to administer WK experimental items
0,	***	flag to administer AR experimental items
0,	***	temporary variable if administer WK experimental flag is 0 (false)
0,	***	temporary variable if administer AR experimental flag is 0 (false)

#### INPUT WORK FILE:

WORK01.DAT      contains the prospect data for the examinee (enclosed in quotes)

last name	columns 4 - 18
first name	columns 20 - 30

The CAST program ignores other information.

## Output Files

The CAST system uses three output data files. Two of these files reside on the data collection diskette, the other resides on the prospect data diskette

### RESULT FILE :

CAST.DAT            contains a cumulative record of every CAST test administered using that data disk. This file has a capacity limited only by the unused space on the data disk.

#### \*\*\*\* CONTENTS \*\*\*\*

For each test individual, the following block of information appears:

```
-- last name            first name            date
-- WORD KNOWLEDGE
--
--        [ item response and latency data ]
--
-- ARITHMETIC REASONING
--
--        [ item response and latency data ]
--
-- FINAL LATENCY    latency value
```

Each given test item has the following response data per line :

```
Item number
space
Experimental item flag (Y or N)
space
Correct answer
space
Actual item response
space
Correct response flag (Y or N)
space
Ability score (Theta)
space
Posterior Variance (PV)
space
Elapsed time until a response was entered
```

### TEMPORARY RESULTS FILE :

CASTTEMP.XXX            contains the results of the most recent examinee, the format is identical to that of CAST.DAT

OUTPUT WORK FILE :

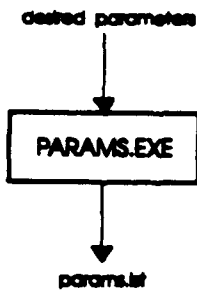
WORK01.DAT

this file is appended with the three probability  
parameters calculated by the CAST system.

## SYSTEM OPERATION

The following is a diagram outlining the flow of information in both the CAST and PARAMS subsystems

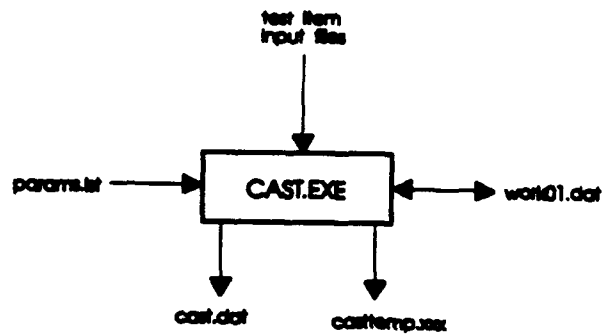
### PARAMS.EXE



Input : desired parameters

Output : params.lst

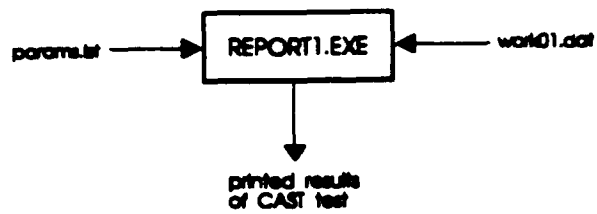
### CAST.EXE



Input : params.lst  
work01.dat  
aritems.inx  
wkitems.inx  
aritems.bin  
wkitems.bin  
ar.prm  
wk.prm  
ar.inf  
wk.inf

Output : work01.dat  
cast.dat  
casttemp.xxx

### REPORT1.EXE



Input : params.lst  
work01.dat

Output : printed results of CAST test

### REPORT2.EXE



Input : params.lst  
work01.dat

Output : printout of predicted AFQT

## PROGRAM FUNCTION

The following is a description of the algorithms and methods used in the execution of the CAST programs.

### \*\*\* CAST.EXE \*\*\*

Initialize variables.

Check for PARAM.LST file, issue error if not found.

Load parameter variables from PARAM.LST file.

Check for Input Work File define in the PARAMS program, issue prompt if not found.

Retrieve examinee data from the Input Work File.

Set timer.

Display the first nine introduction screens.

Subtest loop:

    Display subtest familiarization.

    Initialize subtest variables.

    Load subtest item binary file.

    Load information pointers and parameter pointers for subtest items

    Initialize pointers to test items.

    Initialize used area.

    Initial subtest item characteristics variables.

    Display the test presentation screen.

    Item count loop:

        1) If in all-item-debug mode then show item and get response for all items from one to length, then exit loop

        2) Give experimental question if specified.

        3) Get information table column number.

        4) Get item number.

- 5) Start timer.
- 6) Show item.
- 7) Get response.
- 8) Stop timer.
- 9) Get item parameters.
- 10) Update math
- 11) Write data to output file.
- 12) If in debug mode then display stats.
- 13) Update strat variable.

End item count loop

Get final theta for subtest

Display subtest finished screen

End subtest loop

Store elapsed time

Display "One moment please" screen.

Compute P1, P2, and P3 for displaying results graph

P1 = Probability of AFQT category 1 to 3a.

P2 = Probability of AFQT category 3b.

P3 = Probability of AFQT category 4 or 5.

If in write-to-output-disk mode, write answer data to temporary data file CASTTEMP.XXX, append results to CAST.DAT, and update the work file, WORK01.DAT with the calculated probabilities.

Run the report program specified in the PARAMS.LST file.

\*\*\* REPORT1.EXE \*\*\*

Initialize variables, read in parameter variables from the PARAM.LST file.

Retrieve examinee data from the Input Work File.

Clear screen and display "The CAST test has ended."

Prompt for Recruiter to enter password.

Verify password.

Prompt for display of the CAST results.

Display results if requested.

Prompt for print of the CAST results.

Print results if requested.

Prompt for "Sales Presentation Disk."

\*\*\* REPORT2.EXE \*\*\*

Initialize variables, read in parameter variables from the PARAM.LST file.

Retrieve examinee data from the Input Work File.

Clear screen and prompt to display the predicted AFQT.

Display the predicted AFQT if requested.

Prompt for print of the predicted AFQT.

Print the predicted AFQT if requested.

Prompt for "Sales Presentation Disk."